

Remarks/Arguments

Objections to Claims 2-7 and 9

The Examiner indicated that the term “apparatus” in Claims 2-8 should be changed to “ultramicrotome.” This change has been made and Applicants request that the objection be withdrawn.

The Examiner also indicated that in Claim 9 “A” should be changed to “An.” This change has been made and Applicants request that the objection be withdrawn.

The Examiner requested that the range within a range in Claim 4 be removed, *i.e.*, the “particularly a laser or an LED.” Applicants have amended Claim 4 to eliminate the range within a range by deleting the wording “a transmitter of electromagnetic radiation, in particular” and have left only the wording “a laser or an LED” and added the phrase “from said laser or LED” after the recitation of a receiver. This amendment accomplished the same objective that the Examiner intended. Specifically, the amended Claim 4 no longer recites a range within a range. Applicants request that the objection be withdrawn.

Claim Rejections under 35 U.S.C. §103 (Obviousness)

The Examiner rejected Claims 2-7 and 9 under 35 USC §103 as being unpatentable over European Patent No. 0544181 (Niesporek). The Examiner also rejected Claims 2-7 and 9 under 35 USC §103 as being unpatentable over U.S. Patent No. 4,532,838 (Soderkvist). Applicants respectfully traverse both rejections.

The Examiner has indicated that Niesporek et al. teaches all the limitations of Claims 2-7 and 9 except for the light barrier element. However, since “contact sensors and light barriers are very old and well known and also are art recognized equivalents” one of ordinary skill in the art would know to substitute the contact sensor for a light barrier. Several patents are noted as evidence of the equivalency of light barriers and contact sensors.

“A claimed invention is unpatentable if the differences between it and the prior art “are such that the subject matter as a whole would have been obvious **at the time the invention was made** to a person of ordinary skill in the art.” *In re Dembiczak*, 175 F.3d 994 (USPQ 1999). The

phrase “at the time the invention was made” is the key phrase since it is that phrase that guards against entry into the “tempting but forbidden zone of hindsight.” *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861 Fed. Cir. 1985). To guard against entry to the realm of hindsight reconstruction one must provide the teaching, suggestion or motivation to combine or modify the sighted references. *See In re Roufett*, 149 F.3d 1350 (Fed. Cir. 1998). Combining prior art references without “evidence of such a suggestion, teaching or motivation simply takes the inventor’s disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight.” *In re Dembiczak*, 175 F.3d 994 (USPQ 1999).

The rejection of Claims 2-7 and 9 hinges on the position that Niesporek teaches all the elements of Claims 2-7 and 9, that delimiting device 20 (“contact sensor”) shown in Niesporek et al. is equivalent to a light barrier, and that the substitution of a light barrier for Niesporek’s delimiting device would have been obvious because of this equivalence. There are three main problems with this position. First, Niesporek does not teach an ultramicrotome that measures the space between a specimen and a knife. Second, the opinion that contact sensors and light barriers are art recognized equivalents is incorrect despite the numerous references cited by the Examiner as evidence of that opinion. Third, delimiting device 20 is a sensor that has a particular function and structure, that is unique and not universal among all contact sensors. Therefore, the underlying generalization required to support the Examiner’s rejection, *i.e.*, that all contact sensors are equivalent, is incorrect.

The device described in the ‘654 patent is an apparatus that uses delimiting device 20 to detect when a knife and specimen have contacted each other. Contact by a specimen with delimiting device 20, more specifically, lever arm 32 of delimiting device 20, pushes lever arm 32 to an intermediate position causing electrical drive device 50 to turn off. Thus, contact between lever arm 32 and a specimen turns off drive device 50 which stops movement of the specimen toward the knife. Lever arm 32 is pivoted to angular position 42 after drive device 50 turns off.

The invention recited in Claim 9 uses a light barrier to ascertain a spacing of a few micrometers between the knife and the specimen to prevent contact between the knife and the

specimen, to facilitate the cutting of sections that are 300 nanometers or less thick. Niesporek does not ascertain the spacing between the knife and the specimen, rather it moves a specimen with an electrical drive toward a sensor that turns off the electrical drive when the specimen comes in contact with the a lever arm on the sensor. **Niesporek does not measure a spacing between a specimen and a knife. No measuring occurs, whatsoever.** The movement of the specimen toward the knife occurs without consideration of the distance between the knife and the specimen, and stops only after the specimen touches the lever arm of the sensor. Even if you replaced the delimiting device used in Niesporek and replaced it with a light barrier, you would still need to configure the microtome (that resulted from that combination) to ascertain a spacing. A light barrier functioning as the delimiting device in Niesporek would not ascertain a spacing.

The Examiner's statement that it is well known to replace a contact sensor with a light barrier is unsupported by the structural and functional differences between the two sensors. Contact sensors are sensors which are sensitive to mechanical contact (*i.e.*, touch), producing a signal when activated by touch. Light barriers on the other hand do not require contact with any component of the sensor. Rather, they are activated when the light transmitted by the sensor is interrupted. The Examiner asserts that one of ordinary skill in the art would try the substitution of a light barrier in place of a contact sensor. However, Niesporek used a contact sensor on a microtome despite evidence that light sensors were available. For example, Niesporek indicates that a light barrier could be used to detect when sample holder 51 is in its upper reversal position. (See Niesporek col. 4, lines 60-68). Applicants contend that if light barriers are art recognized equivalents with delimiting device 20, Niesporek himself would have substituted delimiting device 20 for a light barrier, or suggested such a substitution. Notably, the substitution is not made, and neither is the suggestion made, by Niesporek despite indicating in the same patent that a photocell barrier could replace sensor 58. Therefore, **delimiting device 20 was not considered an equivalent of a light barrier even by Niesporek.**

Another point that counters the Examiner's contention that delimiting device 20 and a light barrier are art recognized equivalents is the fact that delimiting device 20 contacts the

specimen. Contact with the specimen can cause contamination of the specimen, cross contamination with other specimens cut on the same device, damage to the specimen, and/or inaccurate positioning. A light barrier eliminates all of these drawbacks since it does not require physical contact with the specimen. These facts alone reject the Examiner's contention that one of ordinary skill in the art would replace delimiting device 20 with a light barrier. Although the Examiner has referenced several patents that state that a light barrier could be used or a contact sensor could be used the references do not state that the two devices are equivalent. In fact, the '848 patent describes how the disclosed invention would be different and require a reconfiguration if a light barrier were used instead of a contact sensor. Applicants respectfully submit that the references that state that a light barrier or contact sensor could be used in a particular application are only evidence that in certain applications the two sensors could be interchangeable. However, that is not a universal principle. Niesporek's suggestion that a light barrier be used for detection of the upper limit of sample holder 51, but then the contrary teaching that a delimiting device be used for positioning the sample holder relative to the blade, is a clear teaching that contact sensors and light barriers are not interchangeable in every application. It also is a clear teaching that those of ordinary skill in the art do not see contact sensors and light barriers as equivalents for every application.

Moreover, the references cited as evidence of the efficacy of light barrier sensors within microtomes have nothing to do with the determining of distance between a specimen to be cut and the cutting surface. Pfeifer uses a light barrier as a safety on a manual microtome – no space determination. Sitte suggests that a light barrier can be used instead of a mechanical sensor for controlling a variable speed transmission, not distance determination between a cutting surface and a specimen. Walter discusses using a light barrier to determine rotational positioning of a disk, not linear distance and positioning between a cutting surface and a specimen. Therefore, the combination of Niesporek and the others cited fail to teach the ultramicrotome recited in Claim 9.

“There are three possible sources of motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary

skill in the art.” *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998). Applicants contend that there is no motivation to combine since the cited art is non-analogous, and the modification of Niesporek changes its principle of operation.

Modification of Niesporek changes its principle of operation

The Examiner has stated that it would have been obvious to one of ordinary skill in the art to have modified Niesporek by replacing his contact sensor with a light barrier. The Examiner proposes a modification that eliminates the contact sensor utilized in Niesporek in exchange for a light sensor. This proposed modification is an improper modification to support a *prima facie* case of obviousness because it suggests a “modification or combination of references [that] would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate.” *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959), MPEP §2143.01. A primary principle that Niesporek teaches is the requirement that the sensor be in contact with the specimen to determine the stopping point of the course movement. **By eliminating the contact sensor, the primary reference, Niesporek, is now devoid of the basic principle upon which it operates. Substantial reconstruction of a primary reference in this manner cannot create a sufficient basis to render claims as *prima facie* obvious.** 270 F.2d 810. Contact between the specimen and the contact sensor is the principle of operation of the Niesporek invention, and since removing this feature from Niesporek would require a change in the basic principle under which Niesporek operates, the modification cannot render Applicant’s claims obvious.

Motivation to modify Niesporek was influenced by impermissible hindsight

In issuing the rejection of the claims of the instant application the Examiner has used impermissible hindsight in combining the teachings of Niesporek and the other references cited to reject Applicant’s claims due to obviousness. References must be viewed without the benefit of impermissible hindsight afforded by the claimed invention. MPEP §2141. The Examiner has in his rejection benefited from the teachings in the instant application in arriving at the determination that the claimed invention is obvious in light of the Niesporek. Without the

disclosure offered by the Applicants the Examiner would have been incapable of coming to the conclusion that the instant application is obvious.

The Examiner has cited a laundry list of patents that supposedly provide the motivation to modify Niesporek to replace the delimiting device of Niesporek with a light barrier. In reaching that conclusion the Examiner points out that one of ordinary skill in the art would replace a contact sensor with a light barrier to reduce the potential for breakage, and also mentions that the two sensors are art-recognized equivalents. Assuming *arguendo* that one of ordinary skill in the art would replace a contact sensor with a light barrier, to reduce the potential for breakage, such a motivation lacks credibility. Although the motivation does not have to match the applicant's motivation to support an obviousness rejection, certain motivations are nothing more than an afterthought to support an invalid obviousness rejection. One of ordinary skill in the art of ultramicrotome technology would not be searching for a sensor that would be less prone to breaking, but would be searching for a sensor that could increase the accuracy of measuring the distance between the specimen and the knife to prevent damage to the knife and specimen. Durability of the sensor would not be a concern to one of ordinary skill in the field of ultramicrotomes since contact between sensor and a diamond blade as used in ultramicrotomes would destroy the blade. The fact that Niesporek used a contact sensor on a microtome despite evidence that light sensors were available, rejects the Examiner's contention that one of ordinary skill in the art would replace a contact sensor with a light barrier in every possible microtome application. Thus, the Examiner's assertion that one of ordinary skill in the art would deem the use of a light barrier in place of a contact sensor is an afterthought used to support a rejection based on impermissible hindsight.

The Examiner is also incorrect in declaring that one of ordinary skill in the art would consider using a light barrier over a contact sensor because the two sensors are art-recognized equivalents. Relying on equivalence as a rationale to support an obviousness rejection requires that the equivalency be art recognized. MPEP §2144.06. Stating that two components are art-recognized equivalents sets the stage for offering evidence of equivalency, but more is needed than a mere assertion. The Examiner has merely made a blanket claim that contact sensors and

light barriers are art-recognized equivalents with no justification for this statement. Equivalency cannot be “based on applicant’s disclosure or the mere fact that the components at issue are functional or mechanical equivalents.” MPEP §2144.06, *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). The Examiner has cited references that state that the contact sensor disclosed could be replaced with a light barrier, but in every instance that such a swap is suggested the operation of the sensor as implemented had nothing to do with sensing a spacing between a blade and a specimen to be cut. Considering that the Examiner has failed to reference any relevant support for the assertion that the sensors are art-recognized equivalents, it can only be assumed that equivalency in this instance has been based on Applicant’s disclosure, and thus the obviousness rejection based on this statement is in error. The laundry list of patents cited as evidence that contact sensors and light sensors are art recognized equivalents all come from industrial machines used to move or cut large scale items such as apparatus for bobbins and bobbin sleeves in a textile plant, system for wrapping large objects, device for emptying refuse containers, etc. The field of industrial equipment does not use a light sensor to increase accuracy of a cutting motion, especially to the degree now claimed, i.e., in the range of a micron or less. Instead, the references, all from industrial applications of light barriers, all teach uses the light barrier to increase the longevity of a machine. Not a single reference cited speaks to the applicability of an industrial light source that measures and positions a cutting device to a micron or less from the substance to be cut.

There was also no motivation to alter Niesporek in light of the long reliance on contact sensors. Contact sensors in microtomes have been the mainstay for determining the positioning of the knife relative to the specimen to be cut. The limiting device in Niesporek is a movable plate linked to a microswitch, i.e., a contact sensor. A specimen is moved toward this plate until switching point of the microswitch is reached, causing the progression of the specimen toward the knife to halt. That is remarkable considering the longstanding problems associated with microtomes that use contact sensors to determine distance between a specimen and a knife. Those problems include:

1) The specimen contacts the plate leading to possible contamination of the specimen and the knife.

2) The microswitch does not have the requisite repeatability in the micrometer range.

3) The limiting device only positions the specimen to a predetermined point.

Consequently, despite the longstanding problems associated with using contact sensors in microtomes there was no change to the light barrier that the Examiner has indicated would have been an obvious modification of Niesporek. Despite ample opportunity to solve the inherent problems in cutting samples with a microtome that are solved by the instant application, i.e., preventing specimen damage and contamination, and improving the precision of the microtome, there have been no attempts to implement a light barrier sensing device on a microtome until the Applicants invented the apparatus of the instant application. Thus, the Examiner's cited motivation to combine Niesporek with Mohr (or the others) looks more like a motivation born out of impermissible hindsight reconstruction.

For all the reasons presented above, Niesporek fails to form a *prima facie* case of obviousness with respect to Claims 9 and 18. Therefore, Claims 9 and 18 are patentable over Niesporek. Claims 2-7 & 16-17, dependent from Claim 9, enjoy the same distinction over the cited prior art. Claims 19-20, dependent on Claim 18, enjoy the same distinction over the cited art. The rejection of Claims 2-7, 9 & 16-20 should be removed.

Rejection of Claims 2-7 and 9 under 35 USC §103 as being unpatentable over U.S. Patent No. 4,532,838 (Soderkvist)

The Examiner has also rejected Claims 2-7 and 9 as obvious in view of Soderkvist. Applicants contend that the Soderkvist is unrelated to the invention recited in Claim 9 and the other claims dependent on Claim 9. Thus, elements of Claims 2-7 and 9 are not taught or suggested by Soderkvist and the other references cited. Soderkvist describes a light that shines toward the knife and specimen (see Col. 2, lines 57-65). The light shines toward the knife and specimen and the light that reflects off the back of the knife enables the viewing of the space between the specimen and the knife by observation through a microscope 9. The principle on

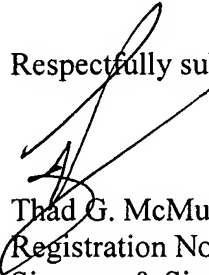
which the Soderkvist microtome functions is entirely different than the invention claimed in subject application. Furthermore, a spacing is not determined by penetrating a light barrier. The positioning of the knife relative to the specimen is done by manually moving the specimen toward the knife until the light completely dies away, which is determination by visual observation through the microscope. (See col. 3, lines 11-15). Thus, unlike the invention recited in Claim 9 the light shining between the knife and specimen is observed by the user to know when the knife contacts the specimen, it is not used to determine a spacing between the knife and specimen.

The other references cited by the Examiner fail to cure the defects of Soderkvist. Therefore, Claims 2-7 and 9 are patentable. Applicants request that the rejection be withdrawn and the claims passed to allowance.

Conclusion

Applicant respectfully submits that all pending claims are now in condition for allowance, which action is courteously requested.

Respectfully submitted,



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